

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A method of facilitating a process performed by a semiconductor processing tool, comprising:

~~inputting process data relating to an actual process being performed by the semiconductor processing tool;~~

~~inputting a first principles physical model including a set of computer-encoded differential equations, the first principles physical model describing at least one of a basic physical or chemical attribute of the semiconductor processing tool;~~

~~performing first principles simulation for the actual process being performed using the physical model to provide a first principles simulation result in accordance with the process data relating to the actual process being performed in order to simulate the actual process being performed, said first principles simulation result being produced in a time frame shorter in time than the actual process being performed~~

inputting a first principles physical model including a set of computer-encoded differential equations, the first principles physical model describing at least one of a basic physical or chemical attribute of the semiconductor processing tool;

inputting process data related to an actual process being performed by the semiconductor processing tool;

setting initial and boundary conditions for a spatially resolved model of a physical geometry of the semiconductor processing tool based on said process data related to the actual process being performed by the semiconductor processing tool;

solving the computer-encoded differential equations of the first principles simulation model for the spatially resolved model concurrently with the actual process being performed and in a time frame shorter in time than the actual process being performed;

providing a first principles simulation result from the solution of the computer-
encoded differential equations solved concurrently with the actual process being performed;
and

using the simulation result as part of a data set that characterizes the actual process
being performed by the semiconductor processing tool.

Claim 2 (Previously Presented): The method of Claim 1, wherein said inputting
process data comprises directly inputting the data relating to the actual process being
performed by the semiconductor processing tool from at least one of a physical sensor and a
metrology tool physically mounted on the semiconductor processing tool.

Claim 3 (Previously Presented): The method of Claim 1, wherein said inputting
process data comprises indirectly inputting the data relating to the actual process being
performed by the semiconductor processing tool from at least one of a manual input device
and a database.

Claim 4 (Original): The method of Claim 3, wherein said indirectly inputting
comprises inputting data recorded from a process previously performed by the semiconductor
processing tool.

Claim 5 (Original): The method of Claim 3, wherein said indirectly inputting
comprises inputting data set by a simulation operator.

Claim 6 (Previously Presented): The method of Claim 1, wherein said inputting process data comprises inputting the data relating to a process performed by the semiconductor processing tool as virtual sensor data from a simulation module.

Claim 7 (Previously Presented): The method of Claim 1, wherein said inputting process data comprises inputting data relating to at least one of the physical characteristics of the semiconductor processing tool and the semiconductor tool environment.

Claim 8 (Original): The method of Claim 1, wherein said inputting data comprises inputting data relating to at least one of a characteristic and a result of a process performed by the semiconductor processing tool.

Claim 9 (Canceled).

Claim 10 (Original): The method of Claim 1, wherein said inputting a first principles physical model comprises inputting fundamental equations necessary to perform first principles simulation to obtain a simulation result that can form part of a data set that characterizes the process performed by the semiconductor processing tool.

Claim 11 (Original): The method of Claim 1, wherein said performing first principles simulation comprises performing first principles simulation concurrently with the process performed by the semiconductor processing tool.

Claim 12 (Original): The method of Claim 11, wherein said performing first principles simulation comprises performing first principles simulation to provide a simulation

result that is a variation of a parameter tested by the concurrent process performed by the semiconductor processing tool.

Claim 13 (Original): The method of Claim 11, wherein said performing first principles simulation comprises performing first principles simulation to provide a simulation result relating to a different parameter than a parameter tested by the concurrent process performed by the semiconductor processing tool.

Claim 14 (Previously Presented): The method of Claim 1, further comprising performing first principles simulation not concurrently with the process performed by the semiconductor processing tool.

Claim 15 (Original): The method of Claim 1, further comprising storing the data set in a library for subsequent use processes performed by the semiconductor processing tool.

Claim 16 (Original): The method of Claim 1, further comprising using a network of interconnected resources to perform at least one of the process steps recited in Claim 1.

Claim 17 (Original): The method of Claim 16, further comprising using code parallelization among interconnected computational resources to share the computational load of the first principles simulation.

Claim 18 (Original): The method of Claim 16, further comprising sharing simulation information among interconnected resources to facilitate a process performed by the semiconductor processing tool.

Claim 19 (Original): The method of Claim 18, wherein said sharing simulation information comprises distributing simulation results among the interconnected resources to reduce redundant execution of substantially similar first principles simulations by different resources.

Claim 20 (Original): The method of Claim 18, wherein said sharing simulation information comprises distributing model changes among the interconnected resources to reduce redundant refinements of first principles simulations by different resources.

Claim 21 (Original): The method of Claim 18, further comprising using remote resources via a wide area network to facilitate the semiconductor process performed by the semiconductor processing tool.

Claim 22 (Original): The method of Claim 21, wherein said using remote resources comprises using at least one of remote computational and storage resources via a wide area network to facilitate the semiconductor process performed by the semiconductor processing tool.

Claim 23 (Currently Amended): A system comprising:
a semiconductor processing tool configured to perform an actual process;
~~an input device configured to input process data relating to the actual process being~~
~~performed by the semiconductor processing tool; and~~

a first principles simulation processor configured to input a first principles physical model including a set of computer-encoded differential equations describing at least one of a basic physical or chemical attribute the semiconductor processing tool; and

an input device configured to input process data related to an actual process being performed by the semiconductor processing tool; and

said first principles simulation processor further configured to:
set initial and boundary conditions for a spatially resolved model of a physical geometry of the semiconductor processing tool based on said process data related to the actual process being performed by the semiconductor processing tool;

solve the computer-encoded differential equations of the first principles simulation model for the spatially resolved model concurrently with the actual process being performed and in a time frame shorter in time than the actual process being performed, and

perform first principles simulation for the actual process being performed using the physical model to provide a first principles simulation result from the solution of the computer-encoded differential equations solved concurrently with the actual process being performed in accordance with the process data relating to the actual process being performed in order to simulate the actual process being performed, said first principles simulation result being produced in a time frame shorter in time than the actual process being performed,

wherein the simulation result is used as part of a data set that characterizes the process performed by the semiconductor processing tool.

Claim 24 (Original): The system of Claim 23, wherein said input device comprises at least one of a physical sensor and a metrology tool physically mounted on the semiconductor processing tool.

Claim 25 (Original): The system of Claim 23, wherein said input device comprises at least one of a manual input device and a database.

Claim 26 (Original): The system of Claim 25, wherein said input device is configured to input data recorded from a process previously performed by the semiconductor processing tool.

Claim 27 (Original): The system of Claim 25, wherein said input device is configured to input data set by a simulation operator.

Claim 28 (Original): The system of Claim 23, wherein said input device is configured to input the data relating to a process performed by the semiconductor processing tool as virtual sensor data from a simulation module.

Claim 29 (Original): The system of Claim 23, wherein said input device is configured to input data relating to at least one of the physical characteristics of the semiconductor processing tool and the semiconductor tool environment.

Claim 30 (Original): The system of Claim 23, wherein said input device is configured to input data relating to at least one of a characteristic and a result of a process performed by the semiconductor processing tool.

Claim 31 (Canceled).

Claim 32 (Original): The system of Claim 23, wherein said processor is configured to input a first principles physical model comprising fundamental equations necessary to perform first principles simulation to obtain a simulation result that can form part of a data set that characterizes the process performed by the semiconductor processing tool.

Claim 33 (Original): The system of Claim 23, wherein said processor is configured to perform said first principles simulation concurrently with the process performed by the semiconductor processing tool.

Claim 34 (Original): The system of Claim 33, wherein said processor is configured to perform the first principles simulation to provide a simulation result that is a variation of a parameter tested by the concurrent process performed by the semiconductor processing tool.

Claim 35 (Original): The system of Claim 33, wherein said processor is configured to perform the first principles simulation to provide a simulation result relating to a different parameter than a parameter tested by the concurrent process performed by the semiconductor processing tool.

Claim 36 (Original): The system of Claim 23, wherein said processor is configured to perform said first principles simulation not concurrently with the process performed by the semiconductor processing tool.

Claim 37 (Original): The system of Claim 23, wherein said processor is further configured to store the data set in a library for subsequent use processes performed by the semiconductor processing tool.

Claim 38 (Original): The system of Claim 23, further comprising a network of interconnected resources connected to said processor and configured to assist said processor in performing at least one of the inputting a first principles simulation model and performing a first principles simulation.

Claim 39 (Original): The system of Claim 38, wherein said network of interconnected resources is configured to use code parallelization with said processor to share the computational load of the first principles simulation.

Claim 40 (Original): The system of Claim 38, wherein said network of interconnected resources is configured to share simulation information with said processor to facilitate said process performed by the semiconductor processing tool.

Claim 41 (Original): The system of Claim 40, wherein said network of interconnected resources is configured to distribute simulation results to said processor to reduce redundant execution of substantially similar first principles simulations.

Claim 42 (Original): The system of Claim 40, wherein said network of interconnected resources is configured to distribute model changes to said processor to reduce redundant refinements of first principles simulations.

Claim 43 (Original): The system of Claim 38, further comprising remote resources connected to said processor via a wide area network and configured to facilitate the semiconductor process performed by the semiconductor processing tool.

Claim 44 (Original): The system of Claim 43, wherein said remote resources comprise at least one of a computational and a storage resource.

Claims 45 - 47 (Cancelled).

Claim 48 (Currently Amended): At least one of non-volatile media and volatile media containing program instructions for execution on a processor, which when executed by the computer system, cause the processor to perform the steps of:

~~inputting process data relating to an actual process being performed by the semiconductor processing tool;~~

~~inputting a first principles physical model including a set of computer-encoded differential equations, the first principles physical model describing at least one of a basic physical or chemical attribute of the semiconductor processing tool;~~

~~performing first principles simulation for the actual process being performed using the physical model to provide a first principles simulation result in accordance with the process data relating to the actual process being performed in order to simulate the actual process being performed; said first principles simulation result being produced in a time frame shorter in time than the actual process being performed~~

inputting a first principles physical model including a set of computer-encoded differential equations, the first principles physical model describing at least one of a basic physical or chemical attribute of the semiconductor processing tool;

inputting process data related to an actual process being performed by the semiconductor processing tool;

setting initial and boundary conditions for a spatially resolved model of a physical geometry of the semiconductor processing tool based on said process data related to the actual process being performed by the semiconductor processing tool;
solving the computer-encoded differential equations of the first principles simulation model for the spatially resolved model concurrently with the actual process being performed and in a time frame shorter in time than the actual process being performed;
providing a first principles simulation result from the solution of the computer-encoded differential equations solved concurrently with the actual process being performed;
and
using the simulation result as part of a data set that characterizes the actual process being performed by the semiconductor processing tool.

Claim 49 (Previously Presented): The method of Claim 1, wherein said performing a first principles simulation comprises:

providing for the first principles simulation a reuse of known solutions as initial conditions for the first principles simulation.

Claim 50 (Previously Presented): The system of Claim 23, wherein the first principles simulator is configured to provide for the first principles simulation a reuse of known solutions as initial conditions for the first principles simulation.

Claim 51 (Cancelled).